

PHY 673 - Radiation Detection and Measurements

Course Code & Number	Course Name	C.H.	Lec.	Lab.	Tut.
PHY 673	Radiation Detection and Measurements	4	4	0	0

Syllabus

General Properties of Radiation Detectors: *Simplified detector model, Models of detector operation, Pulse height spectra, Counting curves and plateaus, Energy resolution, Detection efficiency, Dead time.*

Ionization Chambers: *The ionization process in gases, Charge migration and collection, Design and operation of DC ion chambers, Pulse mode operation.*

Proportional Counters: *Gas multiplication, Design features of proportional counters, Proportional counter performance, Detection efficiency and counting curves, Variants of the proportional counter design.*

Geiger-Mueller counters: *The Geiger discharge, Fill gases, Quenching, Time behavior, The Geiger counting plateau, Design features, Counting efficiency, Time-to-first count method, G-M survey meters.*

Scintillation Detectors: *Organic scintillators, Inorganic scintillators, Light collection and scintillator mounting.*

Photomultiplier Tubes and Photodiodes: *The photocathode, Electron Multiplication, Photomultiplier tube characteristics, Photodiodes as substitutes for photomultiplier tubes, Scintillation pulse shape analysis, Photoionization detectors.*

Semiconductor Diode Detectors: *General consideration in gamma-ray spectroscopy, Gamma-ray interactions, Properties of scintillation gamma-ray spectrometers.*

Germanium Gamma-Ray Detectors: *General consideration, Configuration of germanium detectors, Germanium detector operational characteristics, Gamma-ray spectroscopy with germanium detectors.*

Neutron Detection and Spectroscopy: *Nuclear reactions of interest in neutron detection, Detectors based on the boron reaction, Detectors based on other conversion reactions.*

References

- G.F. Knoll, Radiation Detection and Measurement, 4th Edition, John Wiley & Sons, 2012.
- E.J. Turner, Atoms, Radiation, and Radiation Protection, 3rd Edition, Wiley-VCH Verlag GmbH & Co., KGaA, Weinheim, 2007.
- G.R. Gilmore, Practical Gamma-ray Spectrometry, 2nd Edition, John Wiley & Sons, Ltd., 2008.

